NATURAL RESOURCES CONSERVATION SERVICE
PACIFIC BASIN AREA
CONSERVATION PRACTICE STANDARD

MANURE TRANSFER

(Number)
CODE 634

DEFINITION

A manure conveyance system using structures, conduits, or equipment.

PURPOSE

To transfer animal manure (bedding material, spilled feed, process and wash water, and other residues associated with animal production may be included) through a hopper or reception pit, a pump (if applicable), and a conduit to:

- A manure storage/treatment facility;
- A loading area; and,
- To agricultural land for final utilization. This includes application of manure to the utilization area.

CONDITIONS WHERE PRACTICE APPLIES

The manure transfer component is a part of a planned practice(s) to meet quality criteria for the resource of concern.

Where manure is generated by livestock production or processing; and a conveyance system is necessary to transfer manure from the source to a storage/treatment facility and/or a loading area, and/or from storage/treatment to an area for utilization.

CRITERIA

Criteria for all Purposes

Manure transfer components shall comply with all federal and local laws, rules and regulations.

Structures. All structures, including those which provide a work area around pumps, will be designed to withstand the anticipated static and dynamic loading. The structure shall withstand earth and hydrostatic loading in accordance with Pacific Basin standard, Waste Storage Facility (313). The minimum thickness of component elements of concrete structures shall also be in accordance with the standard, Waste Storage Facility (313). When needed, covers shall be designed to support the anticipated dead and live loads.

Reception pits shall be sized to contain one full day's manure production.

Openings to structures to receive manure from alley scrape collection shall be a minimum of 9 square feet with one dimension no smaller than 4 feet. The opening shall be equipped with a grate designed to support the anticipated loads.

When curbs are needed in conjunction with structures, they shall be constructed of either concrete or wood. Curbs shall be of sufficient height to insure total manure flow into the structure and be adequately anchored.

Pipelines. Design of pipelines shall be in accordance with Pacific Basin standards, Irrigation Water Conveyance (430DD, 430EE, or 430FF). The minimum pipeline capacity from collection facilities to storage/treatment facilities shall be the maximum flow anticipated on a daily basis. The minimum pipeline capacity from storage/treatment facilities to utilization areas shall insure the storage/treatment facilities can be emptied within the time limits stated in the management plan for manure utilization.

Pipelines shall be designed to have a minimum of 2 feet (0.6 meters) per second and a maximum of 6 feet (1.8 meters) per second velocity except where ruminant manure is transferred in a gravity system; in which case velocities can be reduced if a minimum of 5 feet (1.5 meters) of head is provided on the pipe system.

Clean-out access shall be provided for gravity pipelines at a maximum interval of 200 feet (61 meters) for lines carrying non-bedded

manure. For pipelines carrying bedded manure the maximum interval shall be 150 feet (45.7 meters). Gravity pipelines shall not have horizontal curves or bends except minor deflections (less than 10 degrees) in the pipe joints unless special design considerations are used.

Other Conduits. Concrete lined ditches shall be designed in accordance with National Standard, Irrigation Water Conveyance-Non-reinforced Concrete Ditch and Canal Lining (428A). A minimum design velocity of 1.5 feet (0.5 meters) per second shall be used.

Pumps. Pumps installed for manure transfer shall meet the requirements of National Standard, Pumping Plant for Water Control (553). Pumps shall be sized to transfer manure at required system head and volume. Type of pump shall be based on the consistency of manure. Consideration for pump installations shall be based on manufacturer's recommendations.

Safety. The system design shall consider the safety of humans and animals during construction and operation.

Open structures shall be provided with covers or barriers such as gates, fences, etc. Ventilation and warning signs shall be provided for manure transfer systems as necessary to warn of the danger of entry and to reduce the risk of explosion, poisoning, or asphyxiation.

Pipelines from enclosed buildings shall be provided with a water-sealed trap and vent or similar devices where necessary to control gas entry into buildings.

Gravity discharge pipes used for emptying a storage/treatment facility shall have a minimum of two gates or valves, one of which shall be manually operated.

Tractors or other vehicles used to tow manure spreaders or tank wagons shall be sized to reduce the danger of roll-over.

Criteria in Support of the Purpose of Land Application

Manure shall be applied to the utilization area in amounts and at a time consistent with the manure management plan and Pacific Basin standards, Waste Utilization (633) and Nutrient Management (590).

Sprinklers or sprinkler systems shall be designed in accordance with Pacific Basin standard, Irrigation System, Sprinkler (442). Sprinkler system design capacity shall be adequate to apply the required volume of manure at a rate and uniformity that shall prevent runoff and meet the nutrient needs of the plants. Nozzle size shall be appropriate for the consistency of the manure applied. Sprinkler applied, manure contaminated water, shall normally contain less than two-percent solids unless provisions are made for straining or filtering before application.

Manure spreaders and/or tank wagons shall have adequate capacity to insure the emptying of storage/treatment facilities within appropriate time periods as stated in the system operation and maintenance plan.

Gated pipe and other appurtenances used in conjunction with gravity application shall be designed to insure uniform application amounts.

CONSIDERATIONS

Utilization of topography to generate head to reduce pumping requirements;

Economics (including design life), overall manure management system plans, and health and safety factors;

Possible contamination of domestic water systems and ground water;

Loading and unloading of equipment in the vicinity of the manure transfer components;

Subsurface conditions, i.e., depth to bedrock, water table, etc.;

When applicable, compatibility to joint use of manure transfer with irrigation system design requirements;

System for flushing pipelines with clean water;

Provisions for cleaning out solids deposition in ditches;

Pipe pressure rating adjustments required based on manure temperature.

Corrosion resistance and water tightness in the selection of pipe material and joints;

Need for appropriate check valves, anti-siphon protection and open air breaks;

Sanitation needs of all conveyance equipment that leaves the farm in order to prevent the spread of disease;

Potential for salt (struvite) deposits in smaller diameter pipe.

PLANS AND SPECIFICATIONS

Plans and specifications shall be prepared in accordance with the criteria of this standard and shall describe the requirements for applying the practice to achieve its intended use.

Preliminary to developing design and construction plans, survey data must be obtained. Such data shall include sufficient points to develop and show structures, profile, cross sections, and location of physical features (roads, trees, livestock facilities, watercourses, wells, etc.) All surveys will be in accordance with NEH Part 650 - EFH Chapter 1 and NEH Part 640 (Technical Release 62).

Construction plans shall include a to scale plan view, profiles, and facility sectional views. If additional conservation practices are included in the project for water management and water quality concerns, the information necessary to construct these practices will also be conveyed on the plans. Development of plans will be guided by NEH Part 650 - EFH - Chapter 5, and NEM Part 541 Drafting.

Incidental information necessary to construct the job will need to be either communicated in the construction specifications or carried on the construction drawings in the form of construction notes.

As-Built-Plans. As-Built-Plans, when required by the approving individual or permitting authorities, shall reflect all significant changes in alignment, cross section, structure, location, etc. It is expected that all changes will be with prior consent of the individual approving the design. If there were no changes, the original drawings shall be marked, “As-Built.”

OPERATION AND MAINTENANCE

An operation and maintenance plan shall be developed that is consistent with the purposes of the practice, it’s intended life, safety requirements, and the criteria for its design. The plan shall contain the operational requirements for manure transfer. Waste utilization requirements shall include the following:

1. The location(s) of the manure to be collected and applied; the time(s) of collection and application; and,
2. The rates at which it is to be collected and applied; and its volume.

These requirements shall be in accordance practice(s) to address the quality criteria for the resource(s) of concern. It is suggested that O&M requirements for manure transfer components be consolidated into a single document with other features of the Waste Management System.

REFERENCES

1. USDA NRCS, National Engineering Handbook, Part 640 (Technical
2. Release 62)
3. USDA NRCS, National Engineering Handbook, Part 650 - Engineering Field Handbook
4. USDA NRCS, National Engineering Handbook, Part 651 - National Agricultural Waste Management Field Handbook
5. USDA NRCS, SECTION IV of the Field Office Technical Guide
6. Midwest Plan Service, Livestock Waste Facilities Handbook, Publication 18.
7. USDA NRCS, National Engineering Manual, Part 531 - Geology